

WHAT IS CLAIMED IS:

1. A voltage generating circuit comprising:

a first transistor of a first conductivity type connected between a reference voltage node supplied with a predetermined voltage and a first internal node, and having a control electrode connected to a second internal node;

5 a second transistor of the first conductivity type connected between said reference voltage node and said second internal node, and having a control electrode connected to said first internal node;

a first capacitance element connected between a first input node receiving a first control signal controlling a precharging operation and said first internal node;

10 a second capacitance element connected between a second input node receiving a second control signal controlling charge accumulation and said second internal node;

a third transistor of a second conductivity type connected between said second internal node and an output node, and having a control electrode connected to a third internal node;

15 a third capacitance element connected between said third internal node and a third input node receiving a third control signal controlling charge transfer; and

a fourth transistor of the second conductivity type connected between said output node and said third internal node, and having a control electrode connected to said second internal node.

2. The voltage generating circuit according to claim 1, further comprising:

at least one voltage drive stage connected between said output node and a final output node, for generating a final voltage on said final output node,

said voltage drive stage including;

5 a fifth transistor of the second conductivity type connected between an input node of said voltage drive stage and an output node of said voltage drive stage, and

having a control electrode connected to a fourth internal node,

a fourth capacitance element coupled to the input node of said voltage drive stage, the first and second control signals being applied alternately to the fourth capacitance elements in a connection sequence when said at least one voltage drive stage includes a plurality of such voltage drive stages,

a sixth transistor of the second conductivity type connected between said fourth internal node and the output node of said voltage drive stage, and having a control electrode connected to the input node of said voltage drive stage, and

a fifth capacitance element coupled to said fourth internal node, a fourth control signal and said third control signal being applied alternately to the fifth capacitance elements in the connection sequence when said at least one voltage drive stage includes a plurality of such voltage drive stages.

3. The voltage generating circuit according to claim 2, wherein

said second control signal attains a first logical level when a predetermined time elapses since said first control signal changes from the first logical level to a second logical level, and changes from said first logical level to said second logical level before said first control signal changes from said second logical level to said first logical level,

said third control signal changes from said first logical level to said second logical level when a predetermined time elapses since said second control signal changes to said first logical level, and changes from said second logical level to said first logical level before said second control signal changes from said first logical level to said second logical level,

said third control signal changes from said first logical level to said second logical level when a predetermined time elapses since said second control signal changes to said first logical level, and changes from said second logical level to said first logical level before said second control signal changes from said first logical level to said second logical level, and

20      said fourth control signal is set at the second logical level for a predetermined time period when said first control signal is at the first logical level and said second control signal is at the second logical level, before said first control signal changes to the second logic level after elapse of a predetermined time since transition of said second control signal to the second logic level.

4.    The voltage generating circuit according to claim 2, wherein said at least one voltage drive stage includes a plurality of cascaded voltage drive stages.

5.    The voltage generating circuit according to claim 2, wherein the final voltage is applied from said final output node to internal circuitry, and said voltage generating circuit further includes a capacitance element connected to said final output node.

6.    The voltage generating circuit according to claim 1, wherein said output node generates an internal voltage applied to internal circuitry, and said voltage generating circuit further includes a capacitance element connected to said output node.

7.    A voltage generating circuit comprising:  
a first transistor connected between a precharge voltage supply node supplying a precharge voltage and a first internal node, and having a control electrode connected to a second internal node;  
5      a first capacitance element connected between a first input node receiving a first control signal for precharging and said second internal node;  
a second transistor connected between the first and second internal nodes, and having a control electrode receiving a second control signal controlling charge

accumulation;

10           a third transistor connected between said first internal node and an output node,  
and having a control electrode connected to a third internal node;

          a fourth transistor connected between said output node and said third internal  
node, and having a control electrode connected to said first internal node;

15           a second capacitance element connected between a third input node receiving a  
third control signal controlling second charge precharging and said first internal node;  
and

          a third capacitance element connected between a fourth input node receiving a  
fourth control signal controlling charge transfer and said third internal node.

8. The voltage generating circuit according to claim 7, wherein  
said precharge voltage supply node is supplied with a constant voltage at a  
predetermined voltage level.

9. The voltage generating circuit according to claim 7, wherein  
said precharge voltage supply node is supplied with said second control signal.

10. The voltage generating circuit according to claim 7, wherein  
said third control signal attains and maintains for a predetermined time period a  
second logical level when said second control signal is at a first logical level, and said  
fourth control signal attains and maintains for a predetermined time period the first  
5       logical level when said third control signal is at the second logical level, and  
          precharging of said first internal node is performed when said first control signal  
attains the first logical level while said second control signal is at the second logical level.

11. The voltage generating circuit according to claim 7, further comprising:  
at least one voltage drive stage connected between said output node and said

final output node, and generating a final voltage on said final output node,

said voltage drive stage including;

5 a fifth transistor connected between an input node of said voltage drive stage and an output node of said voltage drive stage, and having a control electrode connected to a fourth internal node,

a fourth capacitance element coupled to the input node of said voltage drive stage,

10 a fifth capacitance coupled to said fourth internal node, and

a sixth transistor connected between said fourth internal node and the output node of said voltage drive stage, and having a control electrode connected to the input node of said voltage drive stage, and

15 when said at least voltage drive stage includes a plurality of such voltage drive stages, the second and third control signals being alternately applied to the fourth capacitance elements in a connection sequence of the voltage drive stages, and said first and fourth control signals are alternately applied to the fifth capacitance elements in the connection sequence.

12. The voltage generating circuit according to claim 11, wherein

said first control signal attains a first logical level and is maintained thereat for a predetermined time period when a predetermined time elapses since said second control signal changes from the first logical level to a second logical level, and said second control signal changes from the second logical level to the first logical level after said first control signal changes from the first logical level to the second logical level,

5 said third control signal attains the second logical level and is maintained thereat for a predetermined period since said second control signal changes to the first logical level, and said second control signal attains the second logical level after said third control signal changes to the first logical level, and

10 said fourth control signal attains the first logical level and is maintained thereat

for a predetermined time after said third control signal changes to the second logical level, and said third control signal changes to the first logical level after said fourth control signal changes to the second logical level.

13. The voltage generating circuit according to claim 11, wherein said final output node applies a final voltage to internal circuitry, and said voltage generating circuit further comprises a capacitance element connected to said final output node.

14. The voltage generating circuit according to claim 7, wherein said output node generates an internal voltage to be applied to internal circuitry, and

5        said voltage generating circuit further comprises a capacitance element connected to said output node.